Claims:

The listing of pending claims is as follows:

1   1.   (Previously Presented)   A method for controlling exposure energy on a
2   patterned wafer substrate, comprising the steps of:
3   controlling the exposure energy with a feedback process control signal of critical
4   dimension,
5   and further controlling the exposure energy with a feed forward process control
6   signal of a compensation amount that compensates for thickness variations in a
7   subjacent layer beneath a top layer, by combining the feed forward process control
8   signal with the feedback process control signal to control the exposure energy used in
9   patterning the top layer,
10   the critical dimension being one of a width, a spacing and an opening of the
11   patterned wafer substrate and the top layer being a non-photoresist layer.

1   2.   (Cancelled)

1   3.   (Original) The method of claim 1, further comprising the step of: supplying the
2   feed forward process control signal by a feed forward controller.

1   4.   (Previously Presented) The method of claim 1, wherein the subjacent layer
2   comprises an interlayer.

1   5.   (Previously Presented) The method of claim 4, wherein the step of controlling the
2   exposure energy by a feed forward process control signal utilizes a signal of
3   measurement of thickness remaining of the interlayer after chemical mechanical
4   planarization thereof.

1   6.   (Original) The method of claim 1, further comprising the step of: calculating the
2   compensation amount according to a polynomial function with a coefficient of the

3 function being based on a measurement of a remaining thickness of a planarized

4 interlayer.

1 7.   (Previously Presented) The method of claim 1, further comprising the step of:

2 calculating the feedback process control signal of critical dimension measurement of a

3 top layer in a previous manufacturing lot.

1 8.   (Previously Presented) The method of claim 1, further comprising the steps of:

2 calculating the compensation amount according to a polynomial function with a

3 coefficient of the function being based on a measurement of a remaining thickness of

4 the subjacent layer; and calculating the feedback process control signal of critical

5 dimension measurement of a top layer in a previous manufacturing lot, the subjacent

6 layer being a planarized interlayer.

1 9.   (Previously Presented) The method of claim 1, further comprising the step of:

2 calculating the compensation amount according to a polynomial function with higher

3 order coefficients set at zero.

1 10.   (Previously Presented) The method of claim 1, further comprising the step of:

2 calculating the compensation amount according to a linear function.

1 11.   (Previously Presented) The method of claim 1, further comprising the step of:

2 calculating the compensation amount according to a segmented linear function.

1 12.   (Previously Presented) A system for controlling exposure energy on a first

2 patterned wafer substrate, comprising:

3   a feed forward controller providing a feed forward control signal to an exposure

4 apparatus based on a thickness measurement of an interlayer of the first patterned

5 wafer substrate for controlling the exposure energy focused on a top layer of the first

6 patterned wafer substrate, and

7   a feedback controller providing a feedback exposure energy control signal to the

8   exposure apparatus based on critical dimension measurement of a top layer of a

9   second patterned wafer substrate of a previous manufacturing lot, the critical dimension

10   being one of a width, a spacing and an opening of the second patterned wafer

11   substrate,

12   wherein a combiner combines the feed forward control signal and the feedback

13   exposure energy control signal to produce a combined signal that is provided to the

14   exposure apparatus, the top layer being a non-photoresist layer.

1   13.   (Original) The system of claim 12, further comprising: a thickness measurement

2   device providing thickness measurement data to the feed forward controller.

1   14.   (Previously Presented) The system of claim 12, further comprising: a critical

2   dimension measurement device providing critical dimension measurement data to the

3   feedback controller.

1   15.   (Previously Presented) The system of claim 12, further comprising:

2   a thickness measurement device providing thickness measurement data to the

3   feed forward controller and

4   a critical dimension measurement device providing critical dimension

5   measurement data to the feedback controller.

1   16.   (Previously Presented) The system of claim 12, further comprising: a thickness

2   measurement device providing thickness measurement data of a shallow trench

3   isolation layer of the first patterned wafer substrate to the feed forward controller.

1   17.   (Previously Presented) The system of claim 12, further comprising: a critical

2   dimension measurement device providing critical dimension measurement data of a

3   poly-gate of wafer substrate of a previous manufacturing lot.

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1   18.   (Previously Presented) The system of claim 12, further comprising:

2   a thickness measurement device providing thickness measurement data of a

3   shallow trench isolation layer of the first patterned wafer substrate to the feed forward

4   controller, and

5   a critical dimension measurement device providing critical dimension

6   measurement data of a poly-gate of a previous manufacturing lot.

1   19.   (Previously Presented) The system of claim 18 wherein,

2   the feed forward controller is user configurable by having one or more polynomial

3   coefficients set to zero in a polynomial function model.

1   20.   (Original) The system of claim 12 wherein;

2   the feed forward controller is user configurable by having one or more polynomial

3   coefficients set to zero in a polynomial function model.

1   21.   (Previously Presented) The system of claim 20, further comprising: a thickness

2   measurement device providing thickness measurement data of a shallow trench

3   isolation layer of the first patterned wafer substrate to the feed forward controller.

1   22.   (Previously Presented) The system of claim 20, further comprising: a critical

2   dimension measurement device providing critical dimension measurement data of a

3   poly-gate of the second patterned wafer substrates of a previous manufacturing lot.